

REMARKS

Claims 1-15 are pending in this application, of which claims 1-4 and 6-7 have been amended and claims 14-15 are newly-added.

The Examiner has objected to the drawings for failing to show the output assist determination device and the determination threshold value changer as disclosed in claim 1; the determination threshold value change prohibiting device as disclosed in claim 2; the terminating device as disclosed in claim 3; and the reduction device as disclosed in claim 4.

Claims 1-13 similarly stand rejected under 35 USC §112, first and second paragraphs, for failing to show the separate "devices", as noted above. The Examiner has suggested that these "devices" are actually steps (e.g., output assist determination device is referred as steps S122, S135) in a control method or commands in a program for a microprocessor/microcontroller.

Applicants do not understand the §112 rejections with regard to claims 8-13 because these claims are in method form and recite steps as opposed to devices.

The Abstract, specification and claims 1-4 and 6-7 have been amended to contain means-plus-function language, instead of the reference to the various "devices". This language is properly supported by the microprocessor programming disclosed in the specification and the flow charts shown in the drawings.

In an interview conducted with the Examiner on February 2, 2003, the Examiner indicated that the §112 rejections would be overcome if the following questions were satisfactorily answered:

1. What threshold value does the claimed "determination threshold value means"

change?

2. How does the determination threshold value means change the threshold value identified above?
3. Where is the “reduction means” recited in claim 4 located and where is it shown in Fig. 1?

In response, Applicants submit the following:

1. As recited in page 4, lines 12-23 of the specification, the control apparatus of the hybrid vehicle of the present invention comprises an “output assist determination means” (step S122 and step S135) for determining whether to assist the output of the engine by the motor based on a determination threshold values (the throttle assist trigger threshold value MTHAST, the air intake passage pressure assist trigger threshold value MAST, or the air intake passage pressure assist trigger threshold value MASTTH); an air-fuel ratio control means (FIECU 12) for changing the air-fuel ratio from the lean side to the rich side or from the rich side to the lean side for the stoichiometric air-fuel ratio; the “determination threshold value changing means” (step S251 and step S301) for changing the determination threshold values depending upon the air-fuel ratio; and the “determination threshold value change prohibiting device (step S254 and step S304) for prohibiting the determination threshold value when the air-fuel ratio is changed from the lean burn condition to the rich burn condition (the rich-spike condition) for recovery of the NOx absorbent catalyst.

As described above, the determination threshold values comprise the throttle assist trigger value MTHAST, the air intake passage pressure assist trigger threshold value MAST, and the air

intake passage pressure assist trigger threshold values. As an example, the throttle assist trigger threshold value MTHAST will be explained. The throttle assist trigger threshold value MTHAST is, as shown in Figs. 4 and 6, a threshold degree of the throttle value opening (obtained by the throttle valve opening sensor S6, see page 11, lines 12-13) exceeds the threshold value MSASNT (with hysteresis). The threshold values are obtained for respective engine speed by retrieval of a table with reference to the present vehicle conditions, such as the state of charge of the battery (depending on the zone of the state of charge of the battery), the engine speed (high speed or low speed) and regeneration power of the motor, and the air-fuel ratio in the air intake passage, in the case of determining depending on the air intake passage pressure assist trigger threshold value. The table has been prepared from a series of experimental results. Accordingly, the unit of the threshold value of the throttle opening is the degree of throttle valve opening.

2. In the case of determining the assist of the engine output based on the intake passage negative pressure threshold value MAST, the threshold value, whose unit is pressure, is changed by the change of the air-fuel ratio, measuring the actual value by the air-fuel sensor 9 and changing the threshold pressure value with reference to the actual value.

The air fuel ratio is measured by the air-fuel sensor S9 (page 12, line 8), and the air intake passage negative pressure threshold value MAST is changed by retrieving a table whether the combustion of the engine is carried out in a lean side or in a rich side while running. Actually, however, when the combustion is changed from the lean burn condition to the rich burn condition, which means that the combustion condition is changed from the normal lean burn

running condition to the rich spiking of the NOx absorbent, the threshold value of the air intake passage negative pressure is maintained at the same threshold value as that in the lean burn condition by the determination threshold change prohibiting means.

The air-fuel ratio can be easily changed by changing the amount of air supply and the amount of fuel supply, while measuring the air-fuel ratio by S9. The lean burn condition is a condition in which fuel is lean in the air-fuel ratio, and the fuel is leaner than the fuel amount in the stoichiometric air-fuel ratio, and the fuel is leaner than the fuel amount in the stoichiometric air-fuel ratio and the rich burn condition, win which the fuel is rich in the air-fuel ratio and the fuel is richer than in the stoichiometric ratio.

3. The “reduction means” means that the air-fuel ratio is changed to the fuel rich side, which means that the air-fuel mixture supplied to the NOx absorbent catalyst 42 becomes a reduced state (page 12, lines 2-4), so that the NOx accumulated in the NOx absorbent can be released from the NOx absorbent. The reduction means is a fuel supply amount controller 31 (page 11, line 5, and in Fig. 1).

Thus, the 35 USC §112, first and second paragraph, rejections should be withdrawn.

Claims 1, 2, 8 and 9 stand rejected under 35 U.S.C. §103(a) as unpatentable over U.S. Patent 5,942,879 to Ibaraki (hereafter “Ibaraki”) in view of U.S. Patent 5,984,033 to Tamagawa et al (hereafter “Tamagawa et al.”) and U.S. Patent 6,020,697 to Shimasaki et al (hereafter “Shimasaki et al.”).

Applicants respectfully traverse this rejection.

Ibaraki discloses a control system for a hybrid vehicle including a traction motor which

drives a drive shaft of the vehicle by electrical energy and has a regenerative function of converting kinetic energy of the drive shaft into electrical energy, a transmission arranged between driving wheels of the vehicle and an internal combustion engine of the vehicle and the traction motor, and a storage battery which supplies electrical energy to the traction motor and stores electrical energy output from the traction motor.

The Examiner has admitted that Ibaraki fails to disclose control of the engine by controlling the air fuel ration, but has cited Tamagawa et al. for teaching this feature, as shown in Fig. 24.

Shimasaki et al. has been cited for teaching the use of a motor and a generator to improve efficiency in a hybrid vehicle.

The passage from column 18, line 61 to column 19, line 9 of Tamagawa et al. discloses if FIDLREG=1 holds at the step S192, a desired throttle opening 0THIDLREG for the idling regeneration is determined. More specifically, the desired opening 0THIDLREG is determined by retrieving a 0THIDLREG table, which is set e.g. as shown in FIG. 24, such that as the absolute value [REGPOWER].vertline. of the amount of regeneration REGPOWER increases, the 0THIDLREG value increases, according to the amount of regeneration REGPOWER. Further, when the desired air-fuel ratio is set to the stoichiometric air-fuel ratio, values suitable for controlling the air-fuel ratio to the stoichiometric air-fuel ratio are used, while the desired air-fuel ratio is set to a value leaner than the stoichiometric air-fuel ratio, values suitable for controlling the air-fuel ratio to the leaner air-fuel ratio are used. Then, the desired throttle valve opening 0THO is set to the 0THIDLREG value at a step S194, followed by the program

U.S. Patent Application Serial No. 09/695,944

proceeding to the step S201.

There is no disclosure in Tamagawa et al. that a determination threshold value is changed depending on whether the air-fuel ratio of the mixture is leaner or richer than the stoichiometer air-fuel ratio, as recited in claims 1 and 8 of the instant application.

Shimasaki et al. also fails to disclose the determination threshold value changing means recited in claims 1 and 8 of the instant application.

Further, Tamagawa et al. also fails to disclose a determination threshold value which is one of a throttle assist trigger threshold value (MTHAST) or an air intake pressure assist trigger threshold value (MAST or MASTTH), as disclosed on page 4, lines 15-16 of the specification of the instant application.

Accordingly, claims 14 and 15 reciting this distinction have been added.

Thus, the 35 USC §103(a) rejection should be withdrawn.

In view of the aforementioned amendments and accompanying remarks, claims 1-15, as amended, are in condition for allowance, which action, at an early date, is requested.

If, for any reason, it is felt that this application is not now in condition for allowance, the Examiner is requested to contact Applicants undersigned attorney at the telephone number indicated below to arrange for an interview to expedite the disposition of this case.

U.S. Patent Application Serial No. 09/695,944

In the event that this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. Please charge any fees for such an extension of time and any other fees which may be due with respect to this paper, to Deposit Account No. 01-2340.

Respectfully submitted,

ARMSTRONG, WESTERMAN & HATTORI, LLP



William L. Brooks
Attorney for Applicant
Reg. No. 34,129

WLB/mla

Atty. Docket No. **001452**
Suite 1000
1725 K Street, N.W.
Washington, D.C. 20006
(202) 659-2930



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PATENT TRADEMARK OFFICE

Enclosures: Substitute Abstract of the Disclosure
 Petition for Extension of Time

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ABSTRACT OF THE DISCLOSURE:

A control system provided in a hybrid vehicle with a combustion engine for outputting a driving force, an electric motor for generating a force for assisting the output from the engine, depending on driving conditions, a power storage unit for storing electric energy generated by the motor acting as a generator using the output from the engine and electric energy regenerated by the motor when the vehicle decelerates. The control system includes an output assist determination means for determining, based on a determination threshold value as the standard, whether to assist the output from the engine by the motor, depending on the driving conditions of the vehicle. An air-fuel controller is provided for changing the air-fuel ratio of the mixture, which is to be supplied to the engine, to a condition leaner or richer than the stoichiometric air-fuel ratio. A determination threshold value changing means is provided for changing the determination threshold value, depending on whether the air-fuel ratio of the mixture is leaner or richer than the stoichiometric air-fuel ratio. A determination threshold value change prohibiting means is provided for prohibiting the operation of the determination threshold value changer when the air-fuel controller changes the air-fuel ratio of the mixture from a condition leaner than the stoichiometric air-fuel ratio to a condition richer than the stoichiometric air-fuel ratio.